



DEC 26 2012

LR-N12-0361

10CFR 50.73

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

LER 272/2012-004
Salem Nuclear Generating Station Unit 1
Facility Operating License No. DPR-70
NRC Docket No. 50-272

SUBJECT: Loss of Circulating Water and Manual Reactor Trip Due to
Hurricane Sandy

The Licensee Event Report, "Loss of Circulating Water and Manual Reactor Trip Due to Hurricane Sandy," is being submitted pursuant to the requirements of the Code of Federal Regulations, 10CFR 50.73(a)(2)(iv)(A) for Reactor Protection System, Auxiliary Feedwater and Main Steam Isolation Valve actuations.

The attached LER contains no commitments. Should you have any questions or comments regarding the submittal, please contact David Lafleur of Salem Regulatory Assurance at 856-339-1754.

Sincerely,

A handwritten signature in black ink, appearing to read "C. Fricker", written over the word "Sincerely,".

Carl J. Fricker
Site Vice President – Salem

Attachments (1)

IE22
NR

cc Mr. W. Dean, Administrator – Region 1, NRC
 Mr. John Hughey, Licensing Project Manager – Salem, NRC
 Ms. E. Bonney, USNRC Senior Resident Inspector, Salem (X24)
 Mr. P. McKenna, USNRC Resident Inspector, Salem
 Mr. P. Mulligan, Manager IV, NJBNE
 Mr. T. Joyce, President and Chief Nuclear Officer – Nuclear
 Mr. T. Cachaza, Salem Commitment Tracking Coordinator
 Mr. L. Marabella, Corporate Commitment Tracking Coordinator
 Mr. D. Lafleur, Salem Regulatory Assurance

NRC FORM 366 (10-2010)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013	Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.
<h2 style="margin: 0;">LICENSEE EVENT REPORT (LER)</h2>			

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4. TITLE Loss of Circulating Water and Manual Reactor Trip Due to Hurricane Sandy

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	30	2012	2012	0 0 4	0	12	26	2012		DOCKET NUMBER

9. OPERATING MODE <div style="text-align: center; font-size: 1.2em;">1</div>	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: <i>(Check all that apply)</i>				
10. POWER LEVEL <div style="text-align: center; font-size: 1.2em;">100%</div>	<input type="checkbox"/> 20.2201(b) <input type="checkbox"/> 20.2201(d) <input type="checkbox"/> 20.2203(a)(1) <input type="checkbox"/> 20.2203(a)(2)(i) <input type="checkbox"/> 20.2203(a)(2)(ii) <input type="checkbox"/> 20.2203(a)(2)(iii) <input type="checkbox"/> 20.2203(a)(2)(iv) <input type="checkbox"/> 20.2203(a)(2)(v) <input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 20.2203(a)(3)(i) <input type="checkbox"/> 20.2203(a)(3)(ii) <input type="checkbox"/> 20.2203(a)(4) <input type="checkbox"/> 50.36(c)(1)(i)(A) <input type="checkbox"/> 50.36(c)(1)(ii)(A) <input type="checkbox"/> 50.36(c)(2) <input type="checkbox"/> 50.46(a)(3)(ii) <input type="checkbox"/> 50.73(a)(2)(i)(A) <input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(i)(C) <input type="checkbox"/> 50.73(a)(2)(ii)(A) <input type="checkbox"/> 50.73(a)(2)(ii)(B) <input type="checkbox"/> 50.73(a)(2)(iii) <input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A) <input type="checkbox"/> 50.73(a)(2)(v)(A) <input type="checkbox"/> 50.73(a)(2)(v)(B) <input type="checkbox"/> 50.73(a)(2)(v)(C) <input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 50.73(a)(2)(vii) <input type="checkbox"/> 50.73(a)(2)(vii)(A) <input type="checkbox"/> 50.73(a)(2)(viii)(B) <input type="checkbox"/> 50.73(a)(2)(ix)(A) <input type="checkbox"/> 50.73(a)(2)(x) <input type="checkbox"/> 73.71(a)(4) <input type="checkbox"/> 73.71(a)(5) <input type="checkbox"/> OTHER Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER	
FACILITY NAME David Lafleur, Senior Compliance Engineer, Salem Regulatory Assurance	TELEPHONE NUMBER (Include Area Code) (856) 339-1754

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
C	SG	P	W318	Y					

14. SUPPLEMENTAL REPORT EXPECTED					15. EXPECTED SUBMISSION DATE		MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE)					<input checked="" type="checkbox"/> NO				

ABSTRACT <i>(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)</i> <p>On October 30, 2012, Salem Unit 1 was in Mode 1, operating at 100% power when its Circulating Water Intake structure was subjected to heavy river debris from Hurricane Sandy. At 0109 hours, the reactor was manually tripped in accordance with operating procedures due to a loss of four of its six Circulating Water Pumps (CWP) {KE/P}. An automatic start of the Auxiliary Feedwater system occurred as expected on unit trip due to low Steam Generator water levels. By 0118 hours, the two remaining CWPs had been tripped due to continuing heavy debris buildup on the Circulating Water (CW) Traveling Screens {KE/SCN}. The unit was stabilized in Mode 3, Hot Standby conditions and operators transitioned from emergency response to normal operating procedures at 0141 hours. A Main Steam Line Isolation was manually initiated at 0513 hours in response to a loss of condenser vacuum.</p> <p>This event is being reported under 10 CFR 50.73(a)(2)(iv)(A), for actuation of the Reactor Protection, Auxiliary Feedwater and Main Steam Line Isolation systems.</p>
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NARRATIVE

PLANT AND SYSTEM IDENTIFICATION

Westinghouse – Pressurized Water Reactor (PWR/4)

Circulating Water System {KE}

Condenser System {SG}

* Energy Industry Identification System {EIS} codes and component function identifier codes appear as {SS/CCC}

IDENTIFICATION OF OCCURRENCE

Event Date: October 30, 2012

Discovery Date: October 30, 2012

CONDITIONS PRIOR TO OCCURRENCE

Salem Unit 1 was in Operational Mode 1. No additional structures, systems or components were inoperable at the time of the discovery that contributed to the event. Salem Unit 2 was in its 2R19 refueling outage and was shutdown and defueled with no fuel movement in progress at the time of this event.

DESCRIPTION OF OCCURRENCE

On October 28, 2012, at approximately 2300 hours, The National Oceanic and Atmospheric Administration (NOAA) projected that Hurricane Sandy would make landfall along the New Jersey coast with hurricane force winds and possible flooding by early October 29, 2012.

On October 29, 2012 at 1105 hours, Phase 3 of the Severe Weather Guidelines procedure was implemented. Phases 1 and 2 had previously been implemented for the storm season and in anticipation of Hurricane Sandy. At 1953 hours, Salem entered its Adverse Environmental Conditions procedure due to sustained high wind speeds of greater than 40 mph.

The Unit 1 Circulating Water Intake Bay was being continuously monitored locally by plant Operations personnel to ensure accurate CW Traveling Screen and CWP status was provided to the control room throughout the storm. The Delaware River level rose continuously throughout the evening and early morning hours. At 2324 hours on October 29, 2012, the river level was recorded at 95.5 feet and rising.

Operators experienced a rapid succession of CW Traveling Screen failures requiring manual trips of associated CWPs. CWP and CW Traveling Screen operating procedure guidance requires manual

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tripping of a CWP when its CW Traveling Screen differential pressure is greater than 8 feet. At 0049 hours on October 30, 2012, the 13B CWP was tripped due to a report of a high differential pressure across the 13B CW Traveling Screen. At 0102 hours, the 11B CWP was manually tripped due to its CW Traveling Screen being reported as having high differential pressure and not turning. At 0103 hours, the 11A CWP was manually tripped due to a report that its CW Traveling Screen had a high differential pressure and had also stopped.

At 0104 hours, a turbine load reduction to 80% power was commenced to maintain condenser backpressure within limits in accordance with the Circulating Water Malfunction procedure.

At 0109 hours, the 12A CWP was manually tripped due to a high CW Traveling Screen differential pressure and operators performed a manual trip of the reactor in accordance with plant operating procedures due to the loss of four CWPs with power above 10%. An automatic actuation of Auxiliary Feedwater occurred as expected due to low Steam Generator water levels induced by the unit transient. Operators entered Emergency Operating Procedure 1-EOP-TRIP-1, Reactor Trip or Safety Injection. At 0111 hours, Operations transitioned to 1-EOP-TRIP-2, Reactor Trip Response.

At 0113 hours, the 12B CWP tripped due to motor overcurrent. At 0118 hours, the remaining 13A CWP was manually tripped due to a high CW Traveling Screen differential pressure.

At 0141 hours, operators transitioned from emergency operating procedures to normal operating procedures maintaining Hot Standby, Mode 3 conditions.

At 0513 hours operators manually initiated a Main Steam Line Isolation due to a loss of condenser cooling and indications of high condenser backpressure.

The maximum recorded river level was 97.2 feet between 0120 and 0135 hours. The maximum recorded sustained wind speed throughout the storm was approximately 55 miles an hour.

CAUSE OF OCCURRENCE

The cause of the loss of all six CWPs was due to heavy river detritus loading on the CW Traveling Screens due to wind, wave and current effects of Hurricane Sandy.

Heavy detritus loading caused high differential screen pressures requiring manual trips of operating CWPs. Buildup of detritus on the CW Traveling Screens caused shear pin breakage and repositioning of screen hubs on rotating shafts causing stopping and in some cases subsequent overload trips. One CWP experienced an instantaneous overcurrent trip due to cavitation as a result of low bay level.

PREVIOUS SIMILAR OCCURRENCES

A review of LERs at Salem Station dating back to 2009 identified two other manual reactor trips in

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response to degraded Circulating Water system conditions. LER 311/2010-001, "Manual Reactor Trip Due to Degraded Condenser Heat Removal" reported a manual trip of Salem Unit 2 on January 3, 2010, due to heavy ice loading on CW Traveling Screens. LER 272/2011-003, "Manual Reactor Trip Due to Degraded Condenser Heat Removal" reported a manual reactor trip of Salem Unit 1 on April 21, 2011, due to abnormally high amounts of river detritus entrainment on the CW Traveling Screens.

SAFETY CONSEQUENCES AND IMPLICATIONS

There were no safety consequences associated with the manual reactor trip. Operators appropriately responded to the loss of CWPs and degradation of condenser pressure by manually tripping the reactor. All safety systems operated as required. Automatic Auxiliary Feedwater actuation occurred as expected for this transient. Manual Main Steamline Isolation was performed in response to indications of high condenser backpressure.

The maximum recorded river level and wind speed during the event did not meet the criteria for Emergency Action Level reporting, Technical Specification or administrative required shutdown actions.

A review of this event determined that a Safety System Functional Failure (SSFF) as defined in Nuclear Energy Institute (NEI) 99-02 did not occur.

CORRECTIVE ACTIONS

1. The CW Intake Structure, CW Traveling Screens and CWPs were inspected for damage. Divers inspected Circulating Water Bays, Traveling Screens and affected CWPs. All intake debris was removed. Traveling Screens and affected CWPs were repaired.
2. The CW system was placed back in service and Unit 1 was returned to service on November 2, 2012 at 2115 hours.
3. A root cause analysis is in progress to assess the design of the CW systems ability to withstand severe weather and to develop operating strategies for the future.

COMMITMENTS

No commitments are made in this LER.